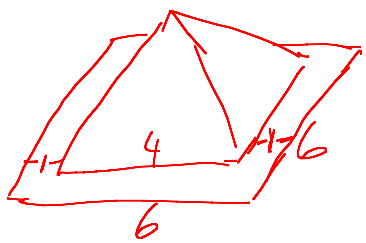
Lesson Notes 4-7 **Scale Factors & 3-D Objects**

Working with scale factors and 3-D objects is similar to working with area and scale factors. We must remember that scale factors are applied to the length, width, and height of the original shape. As a result, when determining the surface area of the scale diagram we must square the scale factor. When determine the volume of the scale diagram we must cube the scale factor.

Example 1: An artist wants to build a replica of the pyramid for an installation at an art gallery. The artist is restricted by the floor dimensions, which are 6.0 m by 6.0 m, and the ceiling height of 3.5 m. As well, the glass sculpture must have room for a 1.0 m walkway around its base. The actual pyramid has a base length of 230.4 m and a slant height of 186.4 m. What scale factor could the artist use to build the sculpture?



$$\text{Scale factor} = \frac{\text{length of Scale}}{\text{length of actual}} = \frac{4}{230.4} = \frac{1}{57.6} \approx \frac{1}{60}$$

Example 2: How much glass will the artist need to build the sculpture in example 1?

$$SA = \cancel{l^2} + 2ls$$
$$= 2(4)(3.1)$$
$$= 24.8$$

$$s = \frac{186.4}{60} = 3.1$$

Example 3: A small tank has a capacity of 1400 m^3, and a similar larger tank has a capacity of 4725 m^3. How many times longer will it take to fill the larger tank than it will take to fill the smaller tank?

$$\frac{V_{large}}{V_{Small}} = \frac{4725\,\cancel{m^3}}{1400\,\cancel{m^3}} = 3.375$$

Example 4: How many times greater is the radius of the larger tank than the radius of the smaller tank in example 3?

$$V_{Small}\,k^3 = V_{large}$$

$$\frac{1400k^3}{1400} = \frac{4725}{1400}$$

$$\sqrt[3]{k^3} = \sqrt[3]{3.375}$$

$$k = 1.5$$

12-16, 19 omit